

## CLARIFICATION OF THE TWO INDO-PACIFIC SPECIES OF BONEFISHES, *ALBULA GLOSSODONTA* AND *A. FORSTERI*

by

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**ABSTRACT.** - Shaklee and Tamaru (1981) identified two species of bonefishes (*Albula*) in the Hawaiian Islands that range elsewhere in the Indo-Pacific region as *A. glossodonta* (Forsskål, 1775) and *A. neoguinaica* Valenciennes, 1847. *Albula forsteri* Valenciennes, 1847, from Tahiti, the replacement name for *Esox argenteus* Forster & Schneider, 1801, is here regarded as the senior synonym of *A. neoguinaica*. *Albula erythrocheilos* Valenciennes, 1847 and *A. seminuda* Valenciennes, 1847 are junior synonyms of *A. forsteri* and *A. glossodonta*, respectively. The bonefish described as *Butyrinus bananus* by Lacepède is considered unidentifiable.

**RÉSUMÉ.** - Clarification de deux espèces de poissons-lait indo-pacifiques, *Albula glossodonta* et *A. forsteri*.

Shaklee et Tamaru (1981) reconnaissent deux espèces d'*Albula* dans les eaux hawaïennes: *A. glossodonta* (Forsskål, 1775) et *A. neoguinaica* Valenciennes, 1847, espèces distribuées également dans la région indo-pacifique. *Albula forsteri* Valenciennes, 1847, nom de remplacement pour *Esox argenteus* Forster & Schneider, 1801, est considérée comme le synonyme senior de *A. neoguinaica*. *Albula erythrocheilos* Valenciennes, 1847 et *A. seminuda* Valenciennes, 1847 sont respectivement des synonymes juniors de *A. forsteri* et de *A. glossodonta*. Le poisson décrit par Lacepède sous le nom de *Butyrinus bananus* n'est pas identifiable.

**Key-words.** - Albulidae, *Albula*, ISE, Indo-Pacific, Taxonomy, Synonymy.

Prior to 1981, the bonefish genus *Albula* Scopoli was regarded as consisting of two species, *A. vulpes* (Linnaeus), type locality Bahamas, known from all tropical and subtropical seas, and *A. nemoptera* (Fowler), type locality Santo Domingo, from the tropical western Atlantic and eastern Pacific. The latter was initially described in the monotypic genus *Dixonina* Fowler, but was reclassified in *Albula* by Rivas and Warlen (1967).

Shaklee and Tamaru (1981) determined that there are two species of *Albula* in the Hawaiian Islands by electrophoretic analysis. Morphological confirmation was provided by nonoverlapping vertebral counts and modal differences for other meristic data, notably the number of lateral-line scales. Also a difference was determined in the shape of the lower jaw (one being more pointed than the other when viewed ventrally), and the size and shape of the patches of small molariform teeth in the mouth (their fig. 4).

Shaklee asked the senior author which of the two species might be *Albula vulpes*. The suggestion was made to obtain frozen material for electrophoresis of *A. vulpes* from

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the western Atlantic, which he did. Surprisingly, the Atlantic specimens revealed two species, neither of which could be biochemically matched to the two in Hawaii. As a result of examining additional material of the two Hawaiian species from other localities of the Indo-Pacific region (including some frozen specimens), Shaklee and Tamari concluded that they occur elsewhere in Indo-Pacific. The complete separation by vertebral counts no longer applied to non Hawaiian localities (James B. Shaklee, pers. comm.). Their 1981 paper dealt only with the Hawaiian populations of the two species for which they selected the names *A. glossodonta* (Forsskål), type locality Red Sea, and *A. neoguinaica* Valenciennes, type locality New Guinea. A subsequent paper on the distribution of species of *Albula* for the rest of the Indo-Pacific is still planned by Shaklee and Tamari.

Because live bonefish were carelessly introduced into Hawaiian waters from the Marquesas with a shipment of Marquesan sardines (*Sardinella marquesensis* Berry & Whiteman) in 1955 (Randall and Kanayama, 1972), a question arose whether the two Hawaiian species of *Albula* were both indigenous to Hawaii. This was solved by Shaklee and Tamari when they examined the holotype and paratype of *A. virgata* (Jordan & Jordan, 1922), described from Hawaii. They were able to identify the holotype as *A. neoguinaica* and the paratype as *A. glossodonta*.

Anticipating systematic work that might be expected as a result of Shaklee and Tamari's research, Whitehead (1986) listed the ten generic synonyms of *Albula* and the 23 nominal species of the genus. He provided type localities, indicated availability of type specimens, and discussed some nomenclatural problems.

The earliest name for a species of *Albula* in the Indo-Pacific region is *Argentina glossodonta* Forsskål, 1775. The holotype is extant in the Zoological Museum of the University of Copenhagen as number 63 of the Forsskål collection, a dried skin of the right side (illustrated by photograph and radiograph print on Plate 36 of Klausewitz and Nielsen, 1965). The senior author brought a frozen specimen of *Albula* from the Red Sea for Shaklee that helped him and Tamari conclude that the Hawaiian species with the more rounded lower jaw, broader and less pointed tooth patches, and higher counts of vertebrae and lateral-line scales is *A. glossodonta*.

The second oldest Indo-Pacific bonefish name is *Esox argenteus* G. Forster, 1777 ("A Voyage round the World", chapter 2, p. 282), but it is a nomen nudum, as noted by Whitehead (1986). This was a fish collected in Tahiti in August, 1773 during Captain James Cook's second voyage on HMS Resolution, 1772-75. George Forster, who at age 18 was the natural history artist of the expedition, made a pencil drawing of the specimen. His father, Johann Reinhold Forster, the naturalist on the expedition, prepared a manuscript description of the fish. Gmelin (1789), without seeing the drawing of *Esox argenteus* by G. Forster or the manuscript description of the fish by J.R. Forster, applied the name *Esox argenteus* to *Esox alepidotus* Forster, 1777, a freshwater fish of New Zealand, now *Galaxias argenteus*. Schneider in Bloch and Schneider (1801: 398), referring to J.R. Forster's manuscript description of *Esox argenteus* (p. 396), named it *Synodus argenteus*. (see Karrer *et al.*, 1994, for the authorship of Bloch and Schneider's fish names). He mistakenly regarded *Esox alepidotus* as the same species. Valenciennes in Cuvier and Valenciennes (1847: 354) resolved the confusion by proposing the name *A. forsteri* to replace *Esox argenteus* Forster & Schneider, unavailable because of *Esox argenteus* Gmelin.

The holotype of *Esox argenteus* Forster & Schneider in Bloch and Schneider, 1801, is extant as MNHN 4515 (erroneously listed as MNHN 5415 by Whitehead, 1986), 246 mm SL, a specimen preserved in alcohol in the Muséum national d'histoire naturelle

in Paris (Bauchot, 1969). It is also the holotype of the replacement name *Albula forsteri* Valenciennes.

Most of G. Forster's illustrations were purchased by Joseph Banks and passed on to the British Museum in London; they were transferred to the British Museum (Natural History) when it was founded in 1881. With the Forster fish drawings available to him at the British Museum (Natural History), now the Natural History Museum, Wheeler (1981) published a discussion of each under the scientific name current at that time. He listed *Esox argenteus* and its replacement name *Albula forsteri* as *A. vulpes*.

With the knowledge that *Albula vulpes* is an Atlantic species, the question arose as to which of the two Indo-Pacific species was represented by the holotype of *A. forsteri*. It was sent on loan to Shaklee who identified it as *A. glossodonta*. Shaklee and Tamaru then decided on *A. neoguinaica* Valenciennes as the correct name for the second Hawaiian species of the genus.

In a paper updating seven fish names of G. Forster's drawings, Randall and Wheeler (1992: fig.1) reproduced his drawing of *Esox argenteus* and labelled it *Albula glossodonta*.

Working together, we examined the five holotypes of nominal Indo-Pacific species of *Albula* in the Muséum national d'histoire naturelle. To our surprise, the holotype of *Esox argenteus* - *A. forsteri* is not *A. glossodonta*; therefore, *A. forsteri* becomes the valid name for the second Indo-Pacific species of the genus.

We discovered a more rapid and more positive way to distinguish the two Indo-Pacific species of *Albula* externally. The distance from the tip of the snout to the end of the maxilla of *A. glossodonta* is shorter relative to the length of the head (measured from the tip of the snout to the end of the opercular membrane) than in *A. forsteri*. The ratio of head length to this snout-upper jaw measurement for *glossodonta* is 3.03-3.31 ( $\bar{x} = 3.16$  for 22 specimens, 99-552 mm SL), compared to 2.67-2.87 ( $\bar{x} = 2.81$  for 19 specimens, 109-537 mm SL) for *forsteri*. A similar difference can be obtained by determining the ratio of the head length to the preoral snout length.

Our diagnostic data on the four identifiable holotypes are given separately in the paragraphs below, followed by discussion of the bonefish described as *Butyrinus bananus* by Lacepède that we regard as unidentifiable. Fin-ray counts and gill-raker counts were made on the four holotypes but are not diagnostic. The shape of the lower jaw is noted; however it was difficult at times, especially with old specimens, to decide if it is clearly pointed or rounded. We did not try to examine the relative size and shape of the tooth patches in the mouth because this would entail damage to the types. It might be added that it is very difficult to measure the tooth patches precisely, and it is not possible to make reproducible counts of the small teeth because they lie in very irregular rows.

*Albula forsteri* Valenciennes, 1847: 354 (replacement name for *Esox argenteus* Forster & Schneider in Bloch and Schneider, 1801), type locality Tahiti, MNHN 4515, 246 mm SL: head length 66.2 mm, snout-upper jaw length 23.1 mm (ratio 2.86); vertebrae 70 (not diagnostic for either species for non Hawaiian specimens); lateral-line scales (to base of caudal fin), 69; lower jaw slightly pointed.

*Albula neoguinaica* Valenciennes, 1847: 350, type locality New Guinea, MNHN 3591, 287 mm SL: head length 77.8 mm, snout-upper jaw length 27.8 mm (ratio 2.80); vertebrae 72, lateral-line scale count not possible (too many scales missing); lower jaw pointed. Regarded as a junior synonym of *A. forsteri*. The specimen was collected by Quoy and Gaimard during the voyage of the Astrolabe, as was the following holotype. Whitehead (1986: 224) refined the type locality to northeastern Irian Jaya.

*Albula seminuda* Valenciennes, 1847: 351, type locality New Guinea, MNHN 3592, 241 mm SL: head length 65.4 mm, snout-upper jaw length 23.3 (ratio 2.81), vertebrae 71, lateral-line scales 68 or 69; lower jaw pointed. A junior synonym of *A. forsteri*. Whitehead (1986: 224) also gave the type locality of Irian Jaya (and presumed it was collected with the type of *neoguinaica*).

*Albula erythrocheilos* Valenciennes, 1847: 352, type locality Tongatapu, MNHN 3593, 510 mm SL (specimen consists of two pieces sewn together; gill arches removed): head length 141.2 mm, snout-upper jaw length 44.4 mm (ratio 3.19); vertebrae 70; lateral-line scale count not possible; lower jaw rounded. Reported as a junior synonym of *A. glossodonta* by Bauchot (1994).

*Butyrinus bananus* Lacepède, 1803: 45, 46, type locality Mauritius, MNHN B.2166, dried skin of left side with front of head missing. Lacepède described this species, in his words, from a short but precise description found in the manuscripts of Commerson. Valenciennes (1847: 347) could not find the Commerson description and suspected that Lacepède used the figure of his Plate 8, figure 2 labelled with the vernacular "Synode renard", but identified as *Synodus vulpes* on p. 319. Nothing in the very brief description or the figure is diagnostic (the figure, for example, has fewer than 45 lateral-line scales). Bertin (1940: 261) listed three paratypes for this species, but Whitehead (1986: 222) pointed out that these were collected by Desjardin in 1820-1830 and by Dussumier in 1830, hence long after Lacepède published the name. The holotype of this species was discovered later by the junior author from Commerson material and identified as the fish from which the drawings were made (by Sonnerat, according to Valenciennes). Because it is only a skin and lacks the important anterior part of the head, we are unable to relate it to either of the two Indo-Pacific species currently recognized.

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